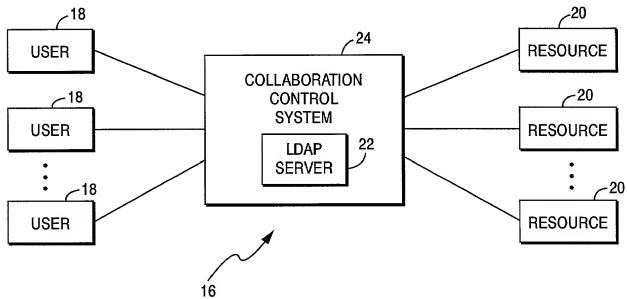
**Fig. 1****Fig. 2**

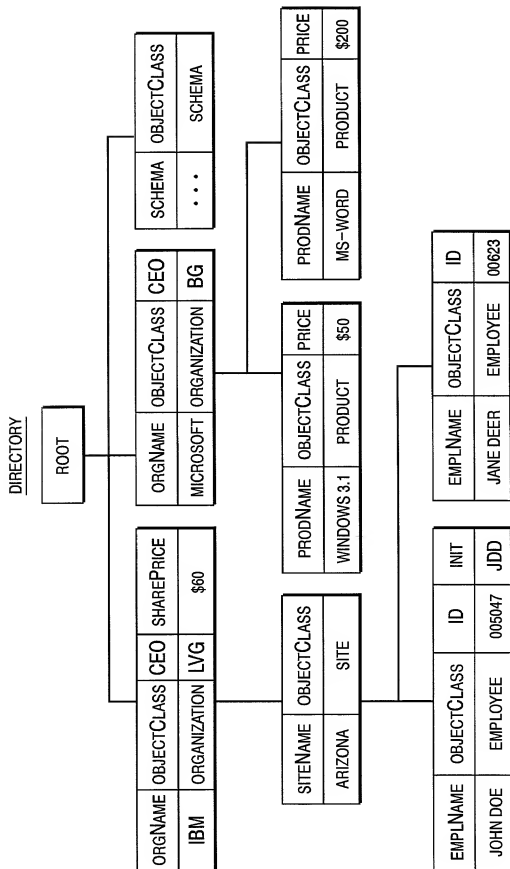


Fig. 3

SCHEMA OBJECT

OBJECT CLASS DEFINITIONS

CLASS	ATTRIBUTES
TOP	M: OBJECTCLASS
ORGANIZATION	M: ORGNAME, CEO O: SHAREPRICE
SITE	M: SITENAME
PRODUCT	M: PRODNAME, PRICE
EMPLOYEE	M: EMPLNAME, ID O: INIT
SCHEMA	M: SCHEMA

PARENT	CHILD
	TOP
TOP	ORGANIZATION
TOP	SITE
TOP	PRODUCT
TOP	EMPLOYEE
TOP	SCHEMA

STRUCTURAL RULES

PARENT	ALLOWED CLASS OF CHILDREN	NAMING ATTRIBUTES
ROOT	SCHEMA	OBJECTCLASS
ROOT	ORGANIZATION	ORGNAME
ORGANIZATION	SITE	SITENAME
ORGANIZATION	PRODUCT	PRODNAME
SITE	EMPLOYEE	EMPLNAME
SITE	EMPLOYEE	ID
SITE	EMPLOYEE	INIT+ID

Fig. 4

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```

dn: cn=user name, ou=organization unit, o=organization, c
cn: user name
sn: surname
givenname: firstname
mail: email address
useraccount: user account alias
userpassword: user password
telephonenumber: user phone number
roomnumber: user room number

```

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LDAP user template

Fig. 5

```

import javax.naming.*;
import javax.naming.directory.*;

class ldapclass {

public void addDn(Properties ldapEntry) throws Exception{

    /* Values we'll use in creating the entry */
    Attribute cn = new BasicAttribute("cn", (String) ldapEntry.get("fullname"));
    ...

    /* Specify the DN we're adding */
    String DnBase1="c="+ldapEntry.get("region");
    String DnBase2="o="+
        ldapEntry.get("business")+" "+DnBase1;
    String DnBase3="ou="+ldapEntry.get("function")+" "+DnBase2;
    String dn = "cn="+ldapEntry.get("fullname")+" "+DnBase3;

    Hashtable enviro = new Hashtable(5, 0.75f);
    /* Specify the initial context implementation to use. */
    ...
    ...
    DirContext context = null;

    /* Add Base DN */
    ...
    /* Add DN */
    try {
        ...
        Attributes basics = new BasicAttributes();
        basics.put(cn);
        ...
        /* Add the entry */
        context.createSubcontext(dn, basics);
    } catch (NameAlreadyBoundException e) { ...
    } catch (NamingException e) { ...
    }
    ...
}
}
}

```

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JAVA ldap interface code example

Fig. 9

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```

...

public class SignUpServlet extends HttpServlet {

...

public void doPost (HttpServletRequest req, HttpServletResponse res)
throws ServletException, IOException {
    String next=nextPage;
    Exception enext = new Exception("Your account has been created!");
    req.setAttribute("javax.servlet.jsp.jspException", enext);
    try {
        /* Collect user information from JSP form */
        String username = req.getParameter("username");
        ...
        /* Sanity Check */
        ...
        else if (username.equals("")) {
            next=errorPage+"?"+"username="+username+"&firstname="+
                firstname+"&middlename="+middlename+"&lastname="+lastname
                + "&emailaddress="+emailaddress
                + "&business="+business
                + "&function="+function
                + "&region="+region;
            Exception e = new Exception("Your username can't be empty!");
            req.setAttribute("javax.servlet.jsp.jspException", e);
        }
        ...
        /* Add an entry to LDAP server */
        else {
            Properties ldapEntry = new Properties();
            ldapEntry.put("username", username);
            ...
            ldapclass.addDn(ldapEntry);

            /* Add a mirror person to eMatrix database */
            PersonBean person = new PersonBean();
            person.setUsername(username);
            ...
            eMatrixRepository.put(person, bos, host);
        }
    } catch (Exception e) {
        ...
    }
    ...
}
...
}

```

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SignUpServlet.java

Fig. 6

```

...
public class MyProfileServlet extends HttpServlet {
...
public void doPost (HttpServletRequest req, HttpServletResponse res)
    throws ServletException, IOException {
    ...
    try {
        /* Step 1: Authenticate user against LDAP sever */
        String step = req.getParameter("step");
        if (step.equals("1")){
            String username = req.getParameter("username");
            String password = req.getParameter("password");
            String password2 = req.getParameter("password2");
            /* Sanity Check and authentication */
            ...
            if (!password.equals(password2))
            {
                next=errorPage+"?"+username="+username+"&step=1";
                Exception epass = new Exception("Please confirm your password!");
                req.setAttribute("javax.servlet.jsp.jspException", epass);
            } else if (!password.equals(ldapclass.getPassword(username))) { //Authentication
                next=errorPage+"?"+username="+username+"&step=1";
                Exception epass = new Exception("Please verify your password!");
                req.setAttribute("javax.servlet.jsp.jspException", epass);
            } else {
                /* Retrieve user profile from LDAP server */
                Properties myprofile = ldapclass.getMyprofile(username);
                ...
            }
            /* Step 2 : Update user profile in LDAP server and eMatrix database
            } else {
            /* Update user Profile in LDAP server */
            /* Collect form information */
            String username= req.getParameter("username");
            ...
            /* Sanity Check */
            ...
            /* Modify the entry in LDAP */
            Properties ldapEntry = new Properties();
            ldapEntry.put("username",username);
            ...
            ldapEntry.put("fullname",fullname);
            /* Delete the old entry */
            ldapclass.deleteUser(username);
            /* Add the new one entry */
            ldapclass.addDn(ldapEntry);
            /* Modify mirror Person in eMatrix database */
            PersonBean person = new PersonBean();
            person.setUsername(username);
            ...
            eMatrixRepository.edit(person,bos,host);
            }
        } catch (Exception e) {
            ...
        }
    }
}

```

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```

...
public class SignInServlet extends HttpServlet {
...

public void doGet (HttpServletRequest req, HttpServletResponse res)
    throws ServletException, IOException {

    String next;
    ContextBindingListener _context;
    PersonBean user;

    /* Get the current session object, create one if necessary */
    HttpSession session = req.getSession(true);

    try {
        String emailpassword=req.getParameter("emailpassword");
        /* If user need account manager send his or her password by email !*/
        if (emailpassword.equals("true")) {
            emailpassword="false";
            String _user;
            _user = req.getParameter("Username");
            /* Retrieve password from LDAP server. */
            String _password= ldapclass.getPassword(_user);
            /* Send email to the user */
            Email email= new Email();
            String emailSubject = new String();
            emailSubject = "Your Password";
            String emailData = new String();
            emailData="Your Password is: "+ _password;
            email.sendMail("SMTPserver", "account manager's email address"
                , ldapclass.getEmailaddress(_user),
                emailSubject,emailData);

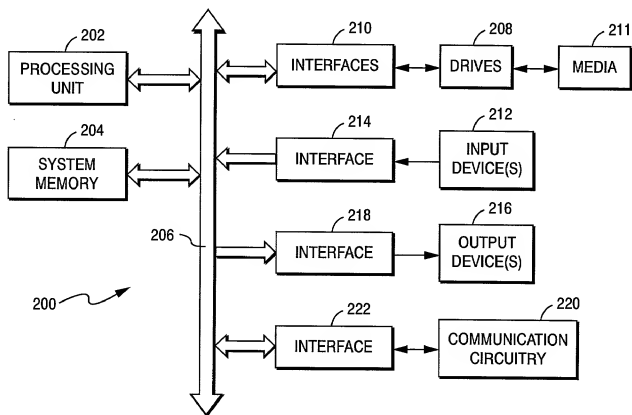
            ...
        }else {
            ...
        }
    }
}

```

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SignInServlet.java

Fig. 8

**Fig. 10**